

WHAT IS CLAIMED IS:

1 1. A method for determining the wear to a battery
2 comprising:
3 determining the temperature of a battery; and
4 determining a wear variable over time as a function of
5 the battery temperature;
6 wherein the wear variable is determined as a sum of
7 temperature-dependent wear contributions over time, with the values of
8 the wear contributions rising more than proportionally as the battery
9 temperature rises.

1 2. The method of Claim 1 wherein the wear variable is
2 dependent on the battery temperature in accordance with the formula
3
$$Q_v = K_0 * c * \exp(-E/T)dt$$

4 where T is a value which corresponds approximately to the battery
5 temperature, K_0 is a defined proportionality factor, c and E are defined
6 constants, and dt is a time interval.

1 3. The method of Claim 1 wherein the dependency of the
2 wear variable on the battery temperature is differentiated on the basis of
3 temperature bands.

1 4. The method of Claim 1 wherein the wear variable
2 increases linearly with the battery temperature over time and linearly with
3 time for battery temperatures between a lower limit temperature and an
4 upper limit temperature.

1 5. The method of Claim 4 wherein the wear variable
2 remains constant over time for a battery temperature below the lower
3 limit temperature.

1 6. The method of Claim 1 further comprising calculating
2 wear contributions in time intervals, with the wear contributions
3 increasing more than proportionally with the battery temperature for
4 battery temperatures above an upper limit temperature.

1 7. The method of Claim 6 wherein the wear contributions
2 for battery temperatures above the upper limit temperature are calculated
3 in accordance with the formula:

4 $q_v = K_0 * A * (1 + a * T + b * T^2)dt,$
5 where K_0 is a proportionality factor, A is a time parameter, a is a first
6 temperature coefficient and b is a second temperature coefficient.

1 8. The method of Claim 7 wherein the wear contributions
2 for battery temperatures below the upper limit temperature are calculated
3 in accordance with the formula

4 $q_v = K_0 * B(T - T_1)dt,$
5 where K_0 is a proportionality factor and B is a time parameter.

1 9. The method of Claim 7 wherein the wear contributions
2 for battery temperatures above a lower limit temperature and below the
3 upper limit temperature are calculated in accordance with the formula

4 $q_v = K_0 * B(T - T_1)dt,$
5 where K_0 is a proportionality factor and B is a time parameter, and the
6 wear contributions for battery temperatures below the lower limit
7 temperature are equal to zero.

1 10. The method of Claim 6 wherein the wear contributions
2 are calculated in time intervals, with the time intervals each being of such
3 a size as a function of the battery temperature that the battery
4 temperature is approximately constant.

1 11. The method of Claim 1 wherein the battery has a
2 storage capacity and the wear variable is a measure of the storage
3 capacity of the battery, with the wear variable being related to the
4 storage capacity of the battery at an earlier time than the time which is
5 applicable to the wear variable.

1 12. The method of Claim 11 wherein the storage capacity
2 of the battery relating to the earlier time is an initial capacity of the
3 battery in a new state.

1 13. The method of Claim 12 wherein the wear variable
2 relating to the earlier time is zero.

1 14. The method of Claim 11 further comprising calculating
2 a present storage capacity of the battery from the difference between an
3 initial capacity of the battery in a new state and the wear variable.

1 15. The method of Claim 1 further comprising determining
2 a linked wear variable from the wear variable and further state variables
3 which describe a state of the battery.

1 16. A storage battery for motor vehicles comprising:
2 temperature measurement means; and
3 computation means for calculating a wear variable of
4 the storage battery;
5 wherein the computation means is configured to
6 calculate the wear variable as a function of measured battery temperature
7 using a method comprising:
8 determining the temperature of a battery; and
9 determining a wear variable over time as a function of
10 the battery temperature;

11 wherein the wear variable is determined as a sum of
12 temperature-dependent wear contributions over time, with the values of
13 the wear contributions rising more than proportionally as the battery
14 temperature rises.

1 17. A system provided with an electrochemical energy
2 store comprising:
3 a temperature measurement device; and
4 a computation device;
5 wherein the computation device calculates a wear
6 variable as a function of measured battery temperature according to a
7 method comprising:
8 determining the temperature of a battery; and
9 determining a wear variable over time as a function of
10 the battery temperature;
11 wherein the wear variable is determined as a sum of
12 temperature-dependent wear contributions over time, with the values of
13 the wear contributions rising more than proportionally as the battery
14 temperature rises.